DEVELOPMENT OF DON INPO METRICS IN COMPLIANCE WITH ITMRA AND GPRA

INTRODUCTION

The Information Technology Management Reform Act of 1996 (ITMRA), initiated as the Clinger-Cohen Bill in 1995, requires that federal agencies orient IT investments toward strategic business and mission focus and manage IT investments based on performance and results; mandates performance measurement of IT; and supports the use of Business Process Reengineering prior to IT acquisition. The Government Performance and Results Act of 1993 (GPRA) Public Law 103-62, requires all federal agencies to develop strategic plans, annual performance plans with goals and measures linked to their strategic plans, and annual assessments of their performance against the goals, starting September 1997 with the first reports due March 2000.

Many managers are reluctant to measure because it is perceived to be too difficult or that the statistics will be misunderstood and/or misused. Below are some excerpts of statements from struggling implementers who are forming interagency lessons-learning user-groups across federal government.

> The value of performance measurements depends on many factors....meeting the OMB mandate won't be easy for many agencies. Some don't have baseline measurements...from which to work....Linking activities to measurable outputs and outcomes not only is difficult, but performance measures don't always directly tie with agency objectives and goals.....And linking activities to the budget is even more challenging since many budget items cross-cut performance measurements....The budget structure should not be driving performance measures and pure statistical measures can be misleading. An increase in the number of projects offered to the public does not necessarily equate to increased customer satisfaction....Measuring customer satisfaction may be more difficult and thus be ignored.[1]

---

1 Federal Employees News Digest, Government Performance Report, "Agencies Struggling with OMB's Performance Measurement Requirements," (October 21, 1996). P.7. Implementers are encouraged to e-mail suggestions and help to OMB's Walter Groszyk, email gorszyk_w@al.eop.gov or FAX (202) 395-5177. The Interior Department's Natural Resources Performance Measurement Forum is hosted by Carl Zulick at (202) 452-5158.

It is important that the culture be clear; metrics are meant to be used as a management tool--not as a management punitive system. In fact, we naturally measure every day and as reminded by J. Davidson Frame of George Washington University, it is our responsibility to do so as accountable project managers without government mandates.

> Innumerate managers are at a disadvantage. Because they do not understand the nature of measurement, they do not know how to use measures to help them function more effectively. A common strategy they employ to deal with their innumeracy is to deny the value of measures for management. "We are dealing with people," they say, "and people are unpredictable and defy attempts to tag them with numbers." The implication is that they are humanists struggling against the exertions of technocrats to digitize humans. The real issue is not one of humanism versus technocracy. The real issue is: Do we have effective information upon which we can make informed judgments? By effective, we mean: Is it objective? Is it replicable? Does it allow us to determine whether we are doing our jobs properly? Can it clarify accountability on the project?" Projects contain plenty of information that meet the criteria of effectiveness. Much of this information is in the form of measures. The challenge is to collect data and present it in a usable manner. The innumerate manager can do neither.[2]

This paper attempts to identify and apply current measurement methodologies that have relevance to the Department of the Navy Information Network Program Office (DON INPO) in its endeavor to serve as a responsible program manager and to implement the ITMRA and GPRA. In my literature review, I examined recently published General Services Administration (GSA), General Accounting Office (GAO) and Office of Secretary of Defense (OSD) guidelines as well as guides and benchmarks of sister services, industry, and of long-time masters and rising consultants in the field. I first introduce definitions and the importance of metrics; adopt and provide excerpts of an Air Force model as well as the GSA and OSD guidelines; and present Marine Corps and industry benchmarks, perspectives, and methodologies. I then apply the concepts of the composite of all source material to formulate a family of metrics specifically designed for

---

2 J. Davidson Frame, The New Project Management, (Jossey-Bass Inc., Publishers, San Francisco, CA 94104, 1994), p. 300.

their perceived pertinence and potential ease of implementation by the stakeholders, management, staff, and customers of DON INPO.

Three common threads weave throughout the research.

(1) Corporate metrics, including information technology (IT) metrics, are customer-focused and need to begin with an organization's strategic plan, for it is within the organization's strategic plan that the business and mission focus is stated.

(2) Quantification is difficult. Caution is given by all sources against counting for the sake of counting, the point being that effectiveness is the goal of the quantification. While return on investment (ROI) could be interpreted to be the measurement goal in ITMRA, identifying the cost of IT is often a misleading challenge because an initial, very large investment is typical. The gain is in how the IT investments result in long-term improvement of the work that is critical to the fulfillment of the organization's business.

(3) Often, at least initially in metrics efforts, the only proof of effectiveness is qualitative. Benchmarking helps as does rolling up weighted measures into a family of metrics that provides senior leadership with a top-level overview of whether the performance of the organization has gone up or down.

DEFINITION AND CONSTRUCTION OF METRICS AND MEASURES

Although there are several recently published sources available to help federal organizations adhere to the ITMRA and GPRA mandates, I found none to be as clear-cut and as prevalent as the Air Force Systems Command (AFSC) Metrics Handbook published in August 1991.

The AFSC Handbook offers a disciplined but simple construct for the metrics package. It includes three elements: (A) operational definition, (B) measurement of the process, and (C) metric presentation.

METRICS PACKAGE CONSTRUCTION

A. Operational Definition:

An unambiguous description of the metric
The population that the metric will include
The frequency of measurement
The source of the data
Any equations required in doing the measurement
Precise definition of key terms
A description of the graphic presentation that will eventually be used to display the data
The customer of the metric
The accountable process owner
The desired outcome expressed in terms of a positive or negative trend (not a numerical goal)
The link between the process being measured, your organization's strategic plan, and command goals

B. Measurement of the Process:

Collecting and recording the data—heart of the metric—serves as the translation of data from process being measured to meaningful information that will be the basis of your improvement activities toward meeting goals and objectives of the organization

C. Metric Presentation--Metric descriptor and graphic presentation of the data:

Metric descriptor is planned during operational definition. It includes:
clear definition of the metric
the source of the data
the population that the metric will include
the owner of the process the metric measures
and identification of the organizational goal that this process is linked to.

The graphic presentation (off-the-shelf software is now available to display the presentation):
very important that it be easily understood by any reader
keep them simple like pie charts, bar and line charts, and barometers
make them attractive so that someone would want to look at them.[3]

The terms "metrics," "measures of effectiveness" and "performance measures" are synonymous to most of us; the AFSC Metrics Handbook uses the term, "metrics."

---

[3] Air Force Systems Command, p. 5-1 - 5-2.

> Metrics can apply to any ongoing or recurring task, activity, system, or process. Metrics are nothing more than meaningful measures. For a measure to be meaningful, however, it must present data that allow us to take action. It must be customer oriented and support the meeting of our organizational goals and objectives. Metrics foster process understanding and motivate action to continually improve the way we do business. This is distinguished from measurement, in that measurement does not necessarily result in process improvement. Good metrics always will....Good metrics will gauge progress in reaching the processes' desired outcomes. This will lead to accomplishment of organizational objectives. This will consequently result in achieving the goals and vision.[4]

The importance is that whatever the term an organization chooses to use to describe its efforts, is secondary to the conditions of "meaningfulness" as described by the AFSC.

ATTRIBUTES OF A GOOD METRIC

The following are basic characteristics of a good metric according to the AFSC handbook:

- It is accepted as meaningful to the customer.
- It tells how well organizational goals and objectives are being met through processes and tasks.
- It is simple, understandable, logical and repeatable.
- It shows a trend.
- It is unambiguously defined.
- Its data is economical to collect.
- It is timely.
- *BUT MOST IMPORTANTLY:* It drives the "appropriate action."

AFSC HANDBOOK STEPS TO METRIC DEVELOPMENT

- Identify and align your purpose for the metric to the organization's mission, vision, goals, and objectives.

- Develop your operational definition starting with your customer.

---

[4] Air Force Systems Command, Andrews Air Force Base, The Metrics Handbook, (August 1991), pp. 1.1-3.5.

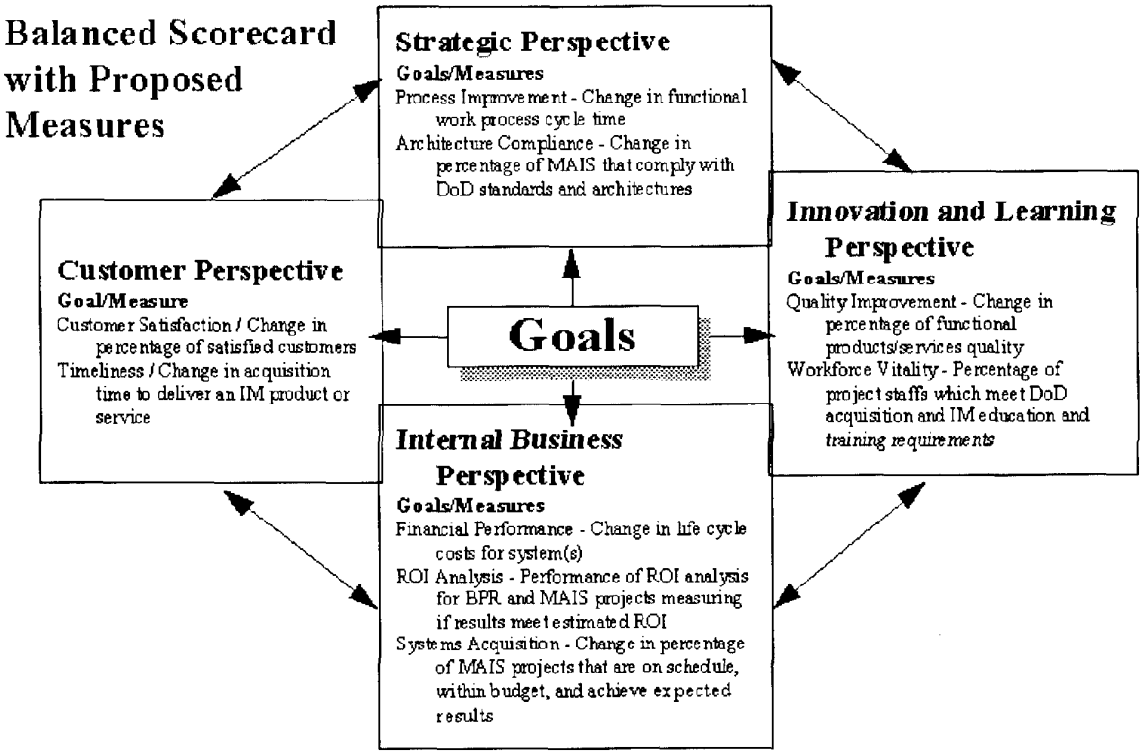


FIGURE 2, BALANCED SCORECARD WITH PROPOSED MEASURES[10]

BENCHMARKING AND FLIGHT DECK INSTRUMENTATION ANALOGY

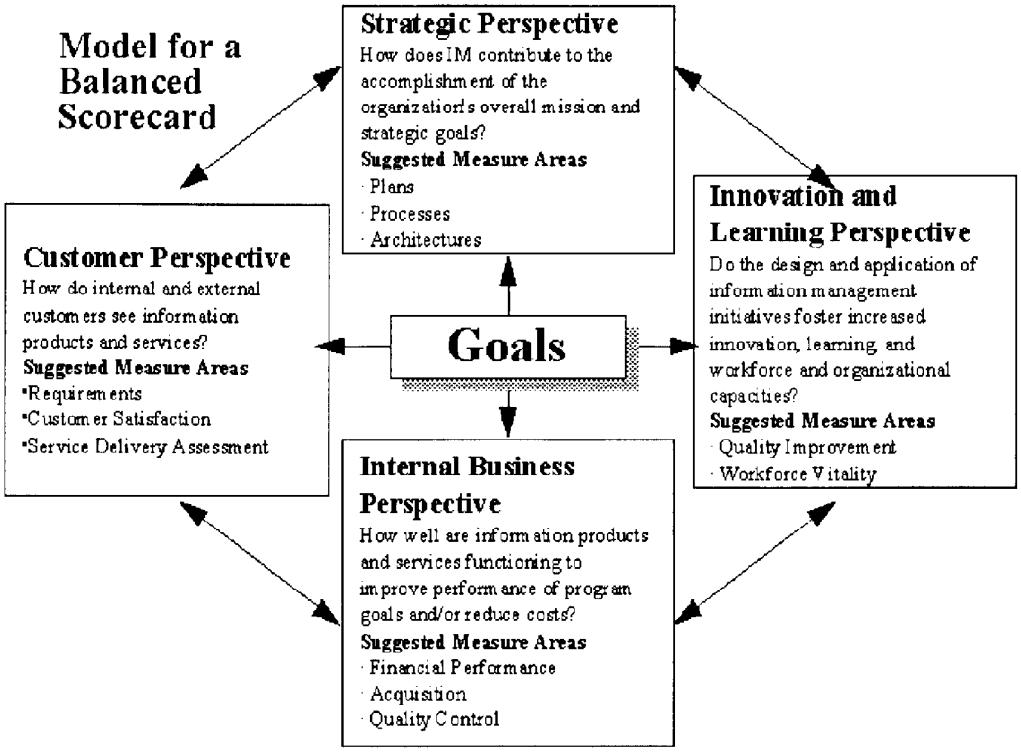
Mr. Howard Rubin, consultant to Chase, Equitable Life, Aetna, Chemical Bank, Sears, IBM, and NYNEX, has created an information technology benchmarking database with more than 18,000 projects across 5,000 companies. He states that people at the highest level want to know if they are spending the right amount on information technology.

> In terms of benchmarking, we can give them comparisons of what companies of similar businesses are spending but you really cannot answer that by benchmarking because you really have to know what their business objectives are. The other stuff they ask about gets to the process—how capable they are compared to other organizations.[11]

---

10 Ibid. , p. 34

11 *Howard Rubin, "Howard Rubin Discusses Metrics, Simulation and Benchmarking,"* Enterprise Engineering, (August, 1996), 25.


Model for a Balanced Scorecard
Strategic Perspective
How does IM contribute to the accomplishment of the organization's overall mission and strategic goals?
Suggested Measure Areas
· Plans
· Processes
· Architectures
Customer Perspective
How do internal and external customers see information products and services?
Suggested Measure Areas
•Requirements
•Customer Satisfaction
•Service Delivery Assessment
Goals
Innovation and Learning Perspective
Do the design and application of information management initiatives foster increased innovation, learning, and workforce and organizational capacities?
Suggested Measure Areas
· Quality Improvement
· Workforce Vitality
Internal Business Perspective
How well are information products and services functioning to improve performance of program goals and/or reduce costs?
Suggested Measure Areas
· Financial Performance
· Acquisition
· Quality Control

continued funding. Communicate results with customers and the public to foster and sustain partnerships. [8]

The balanced scorecard approach was also suggested by the Panel of National Academy of Public Administration for the DoD on Information Management Performance Measures (Developing Performance Measures and Management Controls for Migration Systems, Data Standards, and Process Improvement.) and is one of the methodologies offered in OSD's Guide for Managing Information Technology as an Investment and Measuring Performance.

FIGURE 1, MODEL FOR A BALANCED SCORECARD[9]

[8] *General Services Administration, Office of Governmentwide Policy,* Performance Based Management, Eight Steps to Develop and Use Information Technology Performance Measures Effectively, (December, 1996), pp. 1-2.

[9] Panel of the National Academy Of Public Administration for the U.S. Department of Defense, Information Management Performance Measures, Developing Performance Measures and Management Controls for Migration Systems, Data Standards, and Process Improvement, (January, 1996), p.23. (itaqcm31.gif at www.dtic.mil)

To develop performance measures, determine the objectives of the project; decide how requirements will be met; know the purpose of the results; and understand why the results matter. Measure that which is most important. Agencies will improve the quality of their measures and ensure acceptance if their IT organizations develop and nurture partnerships with customers and stakeholders. Effective performance measures reflect a strong customer focus.

Step 3: Establish Baseline to Compare Future Performance

Baselines enable agencies to determine whether performance improves or declines as a result of an IT investment. Valid baselines are documented, recognized and accepted by customers and stakeholders. Standard agency reports can serve as the baseline if, and only if, the reports apply to the indicators chosen. If no baseline exists, then the performance measures establish the baseline.

Step 4: Select IT Projects with the Greatest Value

In today's tight budget environment, agencies can only fund a limited number of IT projects. Consequently, agencies need to select projects that provide the greatest value. Value is based on the estimated economic return of an IT investment plus its estimated contribution to an organization's business priorities. (This guide uses the terms "IT projects" and "IT investments" interchangeably.) To select the IT investments with the greatest value, establish Investment Review Boards (IRBs) to estimate the value and risks of each investment. The IRB should comprise the major stakeholders from the agency's core functional areas and program offices.

Step 5: Collect Data

The optimal time to focus on the data needed for the chosen indicators is during Steps 2 and 3. Agencies need to ask: "What data are needed to determine the output of the project? What data are needed to determine the effectiveness of the project?" The data used will depend upon availability, cost of collection and timeliness. Accuracy of the data is more important than precision.

Step 6: Analyze Results

After obtaining results, conduct measurement reviews to determine if the project met the objectives and whether the indicators adequately measured results. A key question is: "Do the results differ from what we expected?" During reviews, seek ways to improve performance, refine indicators and identify lessons learned for future projects. The most useful performance reports track results over time and permit identification of trends.

Step 7: Integrate with Management Processes

To assure that results improve performance, integrate them with existing management processes. If the results are not used, no one will take the measurement process seriously. Laws require agencies to submit performance reports with their budget submissions. Because it may take years to realize a project's results, agencies face the challenge of identifying results in their annual budget submissions.

Step 8: Communicate Results

Take the initiative to communicate results internally to improve coordination and increase the focus of workers and managers. Leverage results by sharing them with OMB and Congress to obtain support and

GSA prepared its balanced scorecard guide to help federal agencies develop and implement effective information technology (IT) performance measures. The guide emphasizes that effective performance measures are customer driven; give an accurate and comprehensive assessment of acquisitions, programs, or activities; minimize the burden of data collection; and are accepted and used to improve performance. Furthermore, as stated in the guide, performance-based management links investment planning with the systematic use of select feedback to manage projects and processes. Projects cannot be managed unless they are measured. The "eight steps" constitute a measurement process that includes translating business strategies into actions at the operational level; selecting projects that have the greatest value; developing measurement mechanisms; measuring, analyzing and communicating the results; and finding ways to improve performance. The eight steps provide a logical sequence of tasks that can be integrated with existing management practices.

GSA's EIGHT STEPS TO DEVELOP AND USE INFORMATION TECHNOLOGY PERFORMANCE MEASURES EFFECTIVELY

Step 1: Link IT Projects to Agency Goals and Objectives

The effective measurement of an IT investment's contribution to agency accomplishments begins during the planning stage. Done properly, IT investment planning is based upon the agency mission and strategic business plans. IT organizations build partnerships with program offices and functional areas to define projects that contribute to the agency's goals and objectives. Linking IT projects to goals and objectives can be done using a framework known as the "Balanced Scorecard." The Balanced Scorecard consists of four perspectives that provide a comprehensive view of a business unit. The perspectives include Financial, Customer, Internal Business, and Innovation and Learning. The Balanced Scorecard in Step 2 also serves as a framework to assess performance.

Step 2: Develop Performance Measures

To assess the efficiency and effectiveness of projects, select a limited number of meaningful performance measures with a mix of short- and long-term goals. For large IT projects, the project manager or another key individual leads a team to develop the measures. Measure the outcomes of the IT investment, not just its cost, timeliness and quality. An outcome is the resulting effect of the IT investment on an organization. Examples include measurable improvements in the quality and delivery of the organization's services and products.

- Publicize the results. Share results with key customers, the workers, the boss. Praise workers when the measures show improvement.[6]

A MARINE CORPS MODEL

The Marine Corps Programs Department was featured at the Ninth Annual National Quality Conference in June 1996 for their administrative process analysis and improvement. As others, they show a clear link between metrics and processes. Their steps include these questions:

- What data are we collecting and why?
- How will this data help us in reaching our goal for this analysis?
- How do we collect the data?
- What do we avoid?
- Does the data match process detail?[7]

BALANCED SCORECARD MODEL

The balanced scorecard is a methodology created by Harvard's Robert S. Kaplan and David P. Norton to provide top managers with a comprehensive view of their business. The scorecard includes four perspectives considered to be critical to success; that is, customer, financial, internal business, and innovation and learning. Application of the balanced scorecard approach was adopted by GSA in its Performance Based Management—Eight Steps to Develop and Use Information Technology Performance Measures Effectively.

---

[6] Bob Lewis, "Measure for Measure: For Better Performance Results, Call It What It Is." InfoWorld, (April, 1996) (E-mail: robert.lewis@ps.net and http://www.infoworld.com).

[7] Normand L. Frigon and Dr. Gail R. Dimitroff, Administrative Process Analysis and Improvement, Marine Corps Programs Department Briefing Material (June, 1996).

- Identify and examine existing measurement systems—don't reinvent the wheel –use existing measures when they exist and when they meet your operational definitions.
- Generate new metrics if existing metrics are inadequate.
- Rate your metric against the eight attributes of a good metric.
- Select appropriate measurement tools—Basic and advanced tools—most will be software generated as part of the job. Basic tools: Run chart, control chart, flow chart, cause and effect diagram, check sheet, pareto chart, histogram, scatter diagram. Advanced tools: affinity diagram, interrelationship digraph, tree diagram, prioritization matrices, matrix diagram, process decision program chart, activity network diagram, resource map.
- Baseline your process—must start somewhere to tell how you are improving.
- Collect and analyze metrics data over time to allow examination of trends—special and common cause events should be investigated. Care should be given to guard against tampering in response to special cause events.
- Finalize the metric presentation—the graphic display clearly and concisely communicates how you are performing. There are some really user-friendly displays, such as barometers. Again, some off-the-shelf software packages make this easy to do.
- Initiate process improvement activities based on the trends observed in metrics presentations. Prioritize them and continue to review. Metrics show how effective your processes are in meeting goals and objectives necessary to meeting the mission and vision of the organization.[5]

AN INDUSTRY PERSPECTIVE

Bob Lewis is a consultant with Perot Systems Corp, whose articles are regularly featured in InfoWorld magazine. In the April 1996 issue, "Measure for Measure: For Better Performance Results, Call it what it is," Mr. Lewis says metrics and measures are the same and suggests some guidelines:

- Decide what is important by listing the utmost important products and services you deliver—no more than 7 entries, excluding adjectives and adverbs and should refer to results as end-users define them.
- Define, in end-user terms, goals for your results—not in terms of numbers—usually reliability, performance and cost—but not limited to same.
- Turn the goals into preliminary measures. Don't use indicators because "it is easy to improve an indicator without improving your business." Use positive measures, such as percentage availability rather than downtime and test them to ensure they help meet customer needs. Reducing defects for example is a poor measure because your organization may reduce the defects down to one or two but those one or two may be cause for losing your business.

---

5 Ibid.

His data from 1991 show that only one out of five companies has any data on the total size of their information systems portfolio. Only one in 30 knows at what rate that is changing from year to year. And only one in 100 has across-the-board quality information. He uses Norton/Kaplan balanced scorecard at the business end and links it to his flight deck instrumentation analogy.

He suggests that organizations need to "engage in a process of understanding who the stakeholders are, what success means to them, what the quantifiable aspects of that are, where that information can be obtained and how to build a coordinated "flight deck."[12]

Mr. Rubin further suggests that organizations that start to use metrics to manage their work learn to fly by the instruments instead of working by gut reaction only. By watching the metrics, managers can run various what-if scenarios (flight tests) for a flight plan of the future.

BEST PRACTICES MODEL

The General Accounting Office studied 19 private sector, state government and federal government organizations who applied information technology to improve their mission performance. The study, IMPROVING MISSION PERFORMANCE THROUGH STRATEGIC INFORMATION MANAGEMENT AND TECHNOLOGY; LEARNING FROM LEADING ORGANIZATIONS, is referred to informally as GAO's Eleven Best IM Practices. The study found that senior managers in leading organizations used a consistent set of best practices to improve mission performance through strategic

---

[12] Ibid.

information management. The National Academy of Public Administration Panel for Information Management Performance Measures affirms:

> Strategic information management is a critical, integrated part of any general management framework. Similar to the way modern organizations have gradually become dependent on information technologies, it has become an indispensable lens through which to view most vital general management decisions. Strategic information management typically involves defining a mission based on customer segments and needs; establishing core processes that accomplish the mission; understanding the key decisions that guide mission delivery processes; supporting those decisions with the right information available to the right people at the right time; and using technology to collect, process, and disseminate information in ways that improve the delivery of products, goods, and services to customers.[13]

The eleven practices are most effective when implemented together as mutually reinforcing activities rather than as ad hoc efforts. They are presented by the Panel of the National Academy of Public Administration within the context of their key management functions.

GAO'S ELEVEN BEST INFORMATION MANAGEMENT PRACTICES

Deciding to change
(1) Recognize and communicate the urgency to change information management practices
(2) Get line management involved and create ownership
(3) Take action and maintain momentum
Directing change
(4) Anchor strategic planning in customer needs and mission goals
(5) Measure the performance of key mission delivery processes
(6) Focus on process improvement in the context of an architecture
(7) Manage information systems projects as investments
(8) Integrate the planning, budgeting, and evaluation process
Supporting Change
(9) Establish customer/supplier relationships between line and information professionals
(10) Position a Chief Information Officer as a senior management partner
(11) Upgrade skills and knowledge of line and information management professionals[14]

MORE MODELS AND TOOLS

---

13 Panel of National Academy of Public Administration for the U.S. Department of Defense, p. 53.
14 Ibid.

A Strategic Information Management Self-Assessment was designed by GAO and revised by DON INPO for use in establishing a quantitative baseline of its adherence to the Eleven Best Practices. It is similar to the Software Engineering Institute's Capability Maturity Model. Selection of multiple choice questions results in an aggregated score that equates to maturity levels ranging from Unstructured (1) to Institutionalized (4).

ELEVEN BEST PRACTICES ASSESSMENT LEVELS

Unstructured (Level 1) means that the organization has not defined policies or procedures for implementing information management practices.

Being Defined (Level 2) means that policies are being written that call for the expected IM practices, but they have not yet been put in place.

Being Implemented (Level 3) means that appropriate information management policies and processes have been designed and are being followed only in parts of the organization and/or they are not being consistently followed.

Institutionalized (Level 4) means that the organization has fully adopted the information practices called for, applies them consistently, and improves them through a feedback loop.[15]

The DON Total Quality Leadership Office is responsible for assisting the DON leaders in their quality-focused improvement efforts through education, consultation, information sharing, networking, and technical advice. As part of their consultation services, members of the office developed A Handbook for Strategic Planning in 1994. Most recently, the office has adopted the balanced score card approach in its development of the Navy's Performance Assessment and Results (PAR4) software program which

[15] U.S. General Accounting Office, Executive Guide: Improving Mission Performance Through Strategic Information Management and Technology, (May 1994)

enables organizations to evaluate process performance, customer satisfaction, and organizational self-assessment measures in an integrated manner.[16]

Another OSD-developed automated software tool, TurboBPR, incorporates requirements of GPRA and contains modules for doing improvement analysis and building alternative strategies. TurboBPR makes it easy for managers to identify goals and performance measures, document functional processes, relate improvements to functional performance changes, and measure achievements.

GAO has developed a companion GPRA guide to the GSA Performance Based Management guide. The GAO guide, published in February 1997, is called Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision Making.

MEASURE THE RIGHT THING; THE EFFECTIVENESS/EFFICIENCY CHALLENGE

Armed with an array of tools to choose from, the real work of developing useful metrics is in choosing that which can and should be measured. In another InfoWorld article, IS Productivity Paradox Means We Should Be Measuring Effectiveness, Bob Lewis states: "Measurement can be a powerful tool in the IS management toolbox. Use it well and performance will improve. Use it poorly and only the measure will improve."[17] He warns us not to try to measure productivity unless we are sure of the repetitiveness of the process. An example: Attempt to measure productivity of a screen writer—by words typed per minute? "Yup, when we make a movie, let's get our script from the fastest

---

16 For information about both of these tools, visit the SECNAV TQL website at http://navy-taql.org

17 Bob Lewis, "IS Productivity Paradox Means We Should Be Measuring Effectiveness." InfoWorld, (February, 1996) (E-mail: robert.lewis@ps.net and http://www.infoworld.com).

typist. Well, I don't know how fast Steven Spielberg and his friends type, and I don't care—audience appeal is what matters. Productivity doesn't matter at all." His point is that what does matter is effectiveness. Productivity is just one measure of effectiveness, which is more a matter of value. That is one of the reasons we've failed to find any productivity improvements from the introduction of computers to the workplace—we're measuring the wrong thing.

> What we need are measures of effectiveness, and we have to realize a nasty little fact: Often, the only measures of effectiveness are subjective. Therefore, much of what we realize as our performance measures will relate to how introduction of our IT systems (hardware and software) will be anecdotal and relative to the business of our users. If they are control charting their processes, we have a chance of representing a special cause shown by a blip in their control chart. If they are not, it will be a matter of ambiguous, anecdotal statements, such as, 'takes shorter time,' 'easier,' 'more revisions possible,' 'can talk to more people at once,' etc. [18]

Mr. Lewis makes his point again with specific reference to service call centers.

> To measure our staff's productivity is not the same as to improve it. If you measure how many calls handled, you have presented a dilemma to a high-performing customer service representative who wonders how he might improve his productivity—be as abrupt as you can getting rid of callers as fast as possible. How about number of problems solved. Mightn't you be encouraging the customer service rep to take the easy ones and pass the hard, longer ones onto a fellow unsuspecting, low productivity, coworker?[19]

His suggestion:

> You need to gauge the relative difficulty of different kinds of problems and use a weighted average. Now, when a customer service rep helps a caller use italics in MS Word, that counts for one problem solved. When someone else helps a caller fix his SYSTEM.INI file, she gets 10,000 points and a trip to Bermuda. Now there's a measure worth putting on the wall."[20]

D. Scott Sink, Ph.D., P.E. and Thomas C. Tuttle, Ph.D., authors of Planning and Measurement in Your Organization of the Future and statistical and strategic planning gurus provide us with operational definitions for efficiency and effectiveness.

---

18 Ibid.
19 Ibid.

> Note that efficiency is an input side issue; it deals with resource consumption issues. The operational definition for efficiency is "resources expected or predicted or forecasted or estimated to be consumed (REC) divided by resources actually consumed (RAC). If the number from this ratio is larger than one, then we are more efficient than we "expected" to be; less than one, less efficient than we "expected" to be. The operation definition for effectiveness is the accomplishment of the "right" things. Right is in quotations because what is right is often subject to interpretation, discretion, judgment, and individual or group perception. Did we do the "right" things? Did we gent them done? These are the operational issues associated with effectiveness. Most frequently, two attributes are used to further define effectiveness—timeliness and quality. So, the operational definition of effectiveness becomes the actual accomplishment of the "right" things, on time, within the quality requirements specified (by the customers/ stakeholders). The operational measure for effectiveness is actual output (AO) divided by expected output (EO). If the number is bigger than one, we were more effective than we thought we would be; less than one, less effective than we thought we would be. A number bigger than one isn't necessarily better; less than one necessarily worse.[21]

Again, we must be careful to separate the process of measurement from the process of evaluation. An organization can be effective and not efficient, efficient and not effective, neither effective nor efficient.

The balanced scorecard approach created by Messrs. Norton and Kaplan suggests the measurement of both. Output measures assess efficiency; outcome measures assess effectiveness.

FAMILY OF LINKING MEASURES

Drs. Sink and Tuttle discuss this concept by the term, "a family of measures" in their 1989 book, Planning and Measurement in Your Organization of the Future. The Productivity Center Leaders for Virginia and Maryland, respectively, developed the book with some interaction with Carl Thor of the American Productivity Center in Houston, Texas. "There are a range of measurement methods that result in a family of performance measures designed to explain performance in an organizational system" in other words, an

---

20 Ibid.

21 D. Scott Sink, Ph.D., P.E. and Thomas C. Tuttle, Ph.D., Planning and Measurement in Your Organization of the Future, (Norcross, GA, 1989), pp. 171-172.

aggregate set of measures into one dial that tells you whether the performance of the organization has gone up or down.

PROPOSED FAMILY OF DON INPO METRICS

DON INPO is a part of the DON acquisition and IT organization; therefore, its metrics package will reflect its distinctiveness but will also need to show dependence upon policy from above. As its mission to establish network connectivity for the DON Headquarters area is a distinct mission with its own customer base, according to the GSA Performance Based Management Guide, INPO can be considered its own strategic business unit. DON INPO has not conducted its own strategic planning process; its objectives as directed by the Secretary of the Navy in his 26 October 1995 letter in addition to other DON and DOD strategic plans are good starting points.

Another point of departure is the benchmarking of another acquisition command's metrics, such as the AFSC, also part of the Defense acquisition community. The AFSC has adopted five general divisions for their family of metrics that are tied to command mission areas; namely, program management, test and evaluation, science and technology, base operating support, and functional. *I suggest for DON INPO a similar division:* Program Management Performance (cost/schedule/performance); Network Performance; and Program Office Performance. As is the case in the AFSC example, each of the three top level metrics has several potential "drill down" measures. Because DON INPO is in its earliest stage of developing and collecting its measures of effectiveness, I am initially identifying possibilities based on application of the Air Force model and the balanced scorecard approach.

These metrics and this research form a dynamic document. As the program office matures in meeting its mission and in measuring same, the metrics appendices will expand and mature as well. For instance, benchmarking of five other organizations' help desk operations has been conducted. That information needs to be documented, analyzed, and acted upon in formulation of DON INPO help desk operations and measures. DON INPO is presently feeding back status to its customers and stakeholders through user group meetings, program management reviews, and requirements oversight meetings as well as through publication on the INPO home page, WWW.INPO.NAVY.MIL. This paper is the entry document to the electronic and hard copy version of DON INPO Metrics Public Folder and notebook. As the measures are developed and refined, the public folder and book will be modified accordingly. This effort will assist our internal program management office staff and customers and stakeholders to tangibly review, track and work toward continuation of progress. Therefore, the following pages are offered to provide the initial framework from which our leadership team can embark.

Category: Program Management

Strategic Perspective:

DON INPO Objective as directed by 26 October 1995 SECNAV memo to ASN/RDA establishing DON INPO to implement the network consolidation effort:

The DoN INPO objective is to achieve an enterprise-wide information interchange for SECNAV, OPNAV, and CMC by reengineering the existing diverse technical architectures to conform with the Defense Information Infrastructure (DII)

Further, to provide a facilitated approach to the development of a seamless architecture for the interchange of electronic mail, integrated office automation services, and connectivity throughout the DoN as a basis for the deployment of Defense Message System.

CIO Paper, FY1997 Goals, #13: Complete the first major phases of the DoN WAN providing connectivity to Washington, DC, San Diego, and Norfolk

CIO Paper, Five Year Goals, #1: Complete the Department of the Navy Wide Area Network providing the foundation for all naval organizations to communicate and share information; Navy Wide Area Network will be integrated with the Defense Information Systems Network (DISN); and #2—80% of the Naval Department personnel (all domains) have access to or are connected to the DoN Information Infrastructure (including network, data messaging, directory services, object management, Email, workflow tools, document management, calendaring);

DoD 5000 series Acquisition Directives

Description of potential metrics: (Efficiency and Effectiveness)

Cost and Schedule: Actual compared to plan of Deparatment of the Navy Headquarters (DNHN), of National Capital Region Node (NCRN), of Department of the Navy Wide Area Network (DONWAN)

Performance: Number and rate of deployment/installation of DNHN products; provision compared to requirements from SECNAV/OPNAV/CMC reps and DNHN survey

DNHN outlyer connections status

NCRN connections status

DoNWAN connections status

Improved capabilities from the user's perspective: Anecdotal unless they are measuring their processes. Use customers' control charts to show improved business operations due to impact of our networks. Feedback from user groups)

Help Desk Operations: Number and types of calls and resolution time and effectiveness. (UTOPIA software/pie charts) and Requirements Officers and Help Desk feedback from customers.

Requirements Status: Number and types of requirements and resolution time and effectiveness. (UTOPIA software/pie charts) and Requirements Officers' feedback from customers.

Support to Standards Teams: Cross-DoN participation; impact on interoperability, technical capability and affordability (perhaps ROI; much anecdotal feedback; inquiries of standards library; use of ITEC solutions)

Desired Outcomes:

Meet or Exceed cost and schedule and services/products provided to customers/stakeholders

Provide users with what they need to do their jobs

Provide affordable, technically capable, innovative solutions for interoperation across DoN that link to DoD solutions.

Process Owners: Deputy Program Manager for Plans, Functional Analysis & Metrics
Deputy Program Manager for Engineering and Security
Deputy Program Manager for Resources and Logistics
Deputy Program Manager for Systems Maintenance

Category: Network Performance

Strategic Perspective:

DON INPO Objective as directed by 26 October 1995 SECNAV memo to ASN/RDA establishing DON INPO to implement the network consolidation effort:

The DoN INPO objective is to achieve an enterprise-wide information interchange for SECNAV, OPNAV, and CMC by reengineering the existing diverse technical architectures to conform with the Defense Information Infrastructure (DII)

Further, to provide a facilitated approach to the development of a seamless architecture for the interchange of electronic mail, integrated office automation services, and connectivity throughout the DoN as a basis for the deployment of Defense Message System.

CIO Paper, Five Year Goals, #2—80% of the Naval Department personnel (all domains) have access to or are connected to the DoN Information Infrastructure (including network, data messaging, directory services, object management, Email, workflow tools, document management, calendaring).

Description of Potential Metrics: (Efficiency)

Performance compared to Capacity:
- Number of messages per day sent internally
- Number of messages per day sent externally
- Number of non-delivery reports generated
- Number of machines online at any given instant
- Server hit rates
- Server performance metrics
- Server health metrics
- Number of users currently supported
- Number of Firewall intrusion attempts
- Number and types of viruses detected

Another source for this metric is the Datapro Summary of network "Performance Measures" based on ISO 10164 and the performance management chapter (17) of NETWORK MANAGEMENT SYSTEM ESSENTIALS by Divakara K. Udupa (1996)

Desired Outcome: Reliable and uncompromised network communications

Process Owners: Deputy Program Manager for Plans, Functional Analysis & Metrics
Deputy Program Manager for Engineering and Security
Deputy Program Manager for Resources and Logistics
Deputy Program Manager for Systems Maintenance

Category: Program Office Performance

Strategic Perspective:

DON INPO Objective as directed by 26 October 1995 SECNAV memo to ASN/RDA establishing DON INPO to implement the network consolidation effort:

The DoN INPO objective is to achieve an enterprise-wide information interchange for SECNAV, OPNAV, and CMC by reengineering the existing diverse technical architectures to conform with the Defense Information Infrastructure (DII)

Further, to provide a facilitated approach to the development of a seamless architecture for the interchange of electronic mail, integrated office automation services, and connectivity throughout the DoN as a basis for the deployment of Defense Message System.

CIO Paper, Objective #5—Assess the IT knowledge and skills requirements established for naval personnel and the adequacy of those requirements to achieve the performance goals established for IT management; assess the extent to which executive and management personnel meet the IT knowledge and skills requirements; develop strategies and specific plans for training, professional development and hiring to rectify deficiencies in meeting IT knowledge and skills requirements.

March 5/6 1996 IT Conference Executive Session Action Item—IT Society and development of cadre of IT professionals

INPO Offsite 23 July 1996 identified 6 areas for improvement—Priorities/plan/schedule; structure; inclusion; legitimacy; accountability; communications

Description of potential metrics: (Effectiveness)

Program Office members trained in working in learning organizations, IPT structures.

Use of Learning Tree IT training passports for each Program Office member.

Status of progress toward improvement opportunities identified in INPO offsite.

Reengineered Processes (process control charts), standard operating procedures.

Organizational self-assessment using GAO's Eleven Best IM Practices, SEI CMM, someday self-assessment against President's Award criteria.

(Note: Initial self-assessment done informally 12/96--indicated low level I.)

Status of DON IT Society; track with OPNAV (N-6) Training Office.

Model for INPO Balanced Scorecard

Customers

Employees of the DON Headquarters in Pentagon and several buildings in surround Washington, D.C., area
Employees of the DON systems commands located in the National Capital region
Employees of Department of the Navy in CONUS

Strategic Perspective

SECNAV Letter to ASN/RDA to establish INPO
DON IT Strategic Plan
DON Strategic Plan
ASN/RDA Strategic Plan
DOD ITM Guide
DOD 5000 Acquisition Reform

Goals

Desired Outcomes:
- Reliability
- Connectivity
- Quality
- Productivity
- Effectiveness
- Efficiency

Deseired Output:
- Department of the Navy Headquarters Network
- National Capital Region Node
- Department of the Navy Wide Area Network

Customer Perspective:
Surveys
User Groups
Requirements Officers Relationship
Help Desk Daily Follow-up
Web page and e-mail address

Innovation and Learning Perspective

Program office training of information technology and teamwork
Identification and development of DON IT Professional Career Service
Organizational Self Assessment against GAO II Best Practices or CMM

Internal Business Perspective

Efficiency and Effectiveness of Program Management
Efficiency of Network Performance

Bibliography

Air Force Systems Command, Andrews Air Force Base, The Metrics Handbook, (August 1991).

Frame, J. Davidson, The New Project Management, (San Francisco, 1994).

Frigon, Norman L. and Dimitroff, Dr, Gail R., Administrative Process Analysis and Improvement, Marine Corps Programs Department Briefing Material (June, 1996).

General Services Administration, Office of Governmentwide Policy, Performance Based Management, Eight Steps to Develop and Use Information Technology Performance Measures Effectively, (December, 1996).

Government Performance Report, "Agencies Struggling with OMB's Performance Measurement Requirements," Federal Employees News Digest, (October 21, 1996).

Government Performance Results Act of 1993, Public Law 103-62 (GPRA)

Information Technology Management Reform Act of 1996 (ITMRA)

Lewis, Bob, "IS Productivity Paradox Means We Should Be Measuring Effectiveness." InfoWorld, (February, 1996) (E-mail: robert.lewis@ps.net and http://www.infoworld.com).

Lewis, Bob, "Measure for Measure: For Better Performance Results, Call It What It Is." InfoWorld, (April, 1996) (E-mail: robert.lewis@ps.net and http://www.infoworld.com).

Office of Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, Guide for Management Information Technology as an Investment and Measuring Performance, (Draft December 30, 1996).

Office of Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, Business Process Reengineering (BPR) Process Model, (February, 1995).

Office of Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, TurboBPR Tutorial Version 2.5, (1994-96 Systems Research and Applications Corporation).

Office of Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, Information Technology Management (ITM) Strategic Plan supporting National Defense, (March 1997).

Office of Assistant Secretary of the Navy for Research, Development and Acquisition, The Naval Research, Development and Acquisition Team 1996-1997 Strategic Plan.

Office of Deputy Assistant Secretary of the Navy (C4I/EW/Space), Department of the Navy Information Technology Strategic Plan 1997-2001.

Panel of the National Academy Of Public Administration for the U.S. Department of Defense, Information Management Performance Measures, Developing Performance Measures and Management Controls for Migration Systems, Data Standards, and Process Improvement, (January, 1996 (itaqcm31.gif at www.dtic.mil).

Rodriquez, Antonio, PAR4 (http://navy-taql.org).

Rubin, Howard, "Howard Rubin Discusses Metrics, Simulation and Benchmarking," Enterprise Engineering, (August, 1996).

Secretary of the Navy letter to Assistant Secretary of the Navy for Research, Development and Acquisition dated 26 October 1995 establishing the Department of the Navy Information Network Program Office.

D. Scott Sink, Ph.D., P.E. and Thomas C. Tuttle, Ph.D., Planning and Measurement in Your Organization of the Future, (Norcross, GA, 1989),

U.S. General Accounting Office, Executive Guide: Improving Mission Performance Through Strategic Information Management and Technology, (May 1994).

Wells, Denise L., and Doherty, Linda M., Ph.D., A Handbook for Strategic Planning, (94-02), SECNAV TQL Office (http://navy-taql.org).